Space Weather Forecast

Issued on Wednesday, 04 January 2023 at 01:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate solar activity throughout. Chance of G1/Minor Geomagnetic Storm intervals on 04/05 January.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low with only Common-class flares observed from the five regions on the visible disc. A moderately large and complex region in the northeast quadrant was the most active visible region. The remaining regions on the visible disc are all rather small and magnetically simple. A large region beyond the southeastern limb produced a long-period Common-class flare starting at 03/0620 UTC. This produced a large, fast CME which has been modelled, but does not have an Earth-directed component. No Earth-directed CMEs have been observed in available imagery.

Solar Wind / Geomagnetic Activity: Solar winds observed decreased from slightly elevated to background between 03/0001 and around 03/1200 UTC, falling from 430km/s to around 360km/s. Following this a slow increase, followed by a more rapid increase after 03/1800 UTC was observed, reaching speeds of 430-450km/s by 03/2130 UTC, after which a data gap occurred. Total magnetic field strength has been mainly weak, although moderate since 03/2100 UTC, with the north-south component also varying weakly until that time. Resultant Geomagnetic activity was Quiet to Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Mainly Low solar activity is expected on 04 January, with an increased chance of Moderate-class and Strong-class flares from 05 January due to the apparent active regions beyond the eastern limb, soon to become visible from Earth.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs are currently expected during the four-day forecast period. Solar wind speeds are presently at Slightly Elevated levels, perhaps influenced by the arrival of a CME at Earth late on 03 January. Solar wind speeds are expected to rise either on 04 or 05 January (Day 1 or 2) due to a potential combination of fast winds from two regions on the solar disc, which are forecast to connect with the Earth. Estimated speeds in the region of 450-500km/s are anticipated. These Slightly elevated to Elevated solar wind speeds are expected to persist to the end of the forecast period with a slow downward trend from the 05 or 06 January. Geomagnetic activity will generally be Unsettled through the next 24 hours, but with an increasing risk of Active or G1/Minor Storm intervals due to any possible residual CME effects and then the anticipated onset of one or more HSS later on 04 or early 05 January. Further G1/Minor Storm intervals are then possible through 05 January due to the effects of any HSS connection, with a return to Quiet to Unsettled conditions expected by 06 January (Day 3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no solar radiation storms occurring. However, there is a slight chance of these rising in response to any larger flares that may occur, and perhaps exceeding the S1/Minor Radiation storm level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	40	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	50	50	50
Very Active	R3 to R5 X	No	5	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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